

# Machine Learning based Employee Layoff Prediction System

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## ABSTRACT

In the current fast-changing corporate environment, employee turnover and large-scale layoffs pose considerable challenges for Human Resource (HR) departments and organizational leaders. Employee turnover can result from personal dissatisfaction, low engagement, stagnation in career growth, or external job offers, while layoffs are frequently driven by financial limitations, automation, or strategic reorganization. Both situations affect company performance, employee morale, and operational stability. Conventional reactive strategies to manage attrition and layoffs often result in significant financial and productivity declines. To address this issue, a proactive, data-driven strategy is crucial. This project introduces a Machine Learning-based Employee Attrition Prediction and Layoff Prediction System, which is designed to analyze historical HR data and pinpoint employees who are at a heightened risk of voluntarily departing or being laid off in the future. The system utilizes employee records, encompassing demographic details, job performance, compensation, attendance, and satisfaction levels, to develop predictive models. Techniques such as Logistic Regression, Random Forest, Decision Tree, and Support Vector Machines are employed to categorize employees according to their attrition risk or layoff likelihood.

**Keywords:** *Employee Attrition, Turnover, Decision tree, Machine Learning, Supervised Learning, prediction.*

## I. INTRODUCTION

Employee turnover has emerged as a significant issue for all corporations today, due to its adverse effects on workplace productivity and the timely achievement of organizational goals.

Currently, companies invest considerable effort into their human resource (HR) departments, where one of the most critical responsibilities is to manage

employee attrition in order to minimize turnover. The cost of replacing skilled employees who leave for other companies includes hiring expenses and training for the new hire. Additionally, both tacit and explicit knowledge is lost when an employee departs, and important social relationships may be disrupted. HR professionals often struggle to articulate their value creation to their organizations,

and one of their responsibilities is to enhance HR effectiveness through improved decision-making.

Today, there is a growing trend in HR departments to base decisions on data. Data-driven decisions can lead to improved organizational performance. A common approach involves machine learning (ML). Machine Learning refers to the method of enabling computers to learn from experience.

The idea is for an algorithm to learn from datasets and improve as it is exposed to new information. Potentially, ML could be employed in HR departments to predict employee attrition. Employee turnover plays a significant role in this context. There are various factors influencing employee turnover that could have detrimental effects on the organization. Organizations are actively attempting to predict employee turnover and utilize this data to reduce turnover rates. With high accuracy in predictions, companies can take necessary actions in a timely manner for employee retention or succession. The primary objective is to anticipate employee attrition, specifically whether an employee plans to leave or continue with the organization.

## II. RELATED WORK

[1] *Predicting Employee Attrition using XGBoost Machine Learning Approach* Rachna Jain<sup>1</sup> and Anand Nayyar (2018) The primary ideal of this exploration paper is to prognosticate hand waste i.e. whether the hand is planning to leave or continue to work within the association. This paper propose a new model for prognosticating Hand Waste using Machine Learning grounded approach i.e. XGBoost which is largely robust.

[2] *Machine Learning based Attrition Prediction* Abhiroop Nandi Ray and Judhajit Sanyal (2019) The paper utilizes probabilistic estimation to prognosticate waste from the mortal resource database of a company. Probabilistic estimation models are used in numerous cases, frequently in combination with other styles similar as retrogression and decision trees. New machine learning algorithms similar an XG Boost have also been proposed.

[3] *Analysis and Prediction of Employee Turnover Characteristics based on Machine Learning*

Heng Zhang ,Lexi Xu, Xinzhou Cheng,Kun Chao, Xueqing Zhao (2018) Hand development indicated the staff decides to leave the company. This paper employs machine literacy fashion to sort out the characteristics of hand development. Likewise it espoused GBDT algorithm and LR algorithm to fit the characteristics model which influences hand development. Eventually this paper implements the hand development vaticination in realistic companies, which provides an effective reference for companies to reduce the development rate of workers.

## III. EXISTING SYSTEM

Finance missteps can happen quicker than you might suspect. For a second, consider the representatives for whom month to month pay is the main wellspring of pay. Envision imagine a scenario in which the compensation isn't paid precisely or there is a postponement in discharging pay. Such inconsistencies can negatively affect the assurance of the workers and at last influence the business efficiency. While guaranteeing precise and

opportune installment of pay is significant, sticking to the different laws and guidelines, for example, work law, PF, PT and other legal consistence is additionally basic. Non-adherence with these laws can pull in genuine lawful and budgetary results.

To ensure that your workers are glad and you are law consistent, you have to have an appropriate comprehension of what finance is and how to run finance adequately. We will begin with the nuts and bolts of finance.

## Problem Statement

Design and develop a machine learning model for processing of employee dataset and predict payroll salary of employee using machine learning approach.

## IV. PROPOSED SYSTEM

Payroll Prediction is a software model for calculating efficient and accurate payroll of an employee by considering all the aspect of company requirements. Given the data, we can predict the salary of the job. Using this knowledge we can create many scenarios like what will be the salary of the job or what should be the salary of the position. I am using the baseline model as predicting the average for all jobs. Here average is the average of the salaries in the whole training data. I am considering this as the baseline because there this is a model which would give the average prediction rate. Anything below this is a useless model and probably the combination of features used should not be experimented further. Based on the knowledge of jobs and salary provided I focused my model on three features. First, if the employee is permanent or on contract; second, the location of the job; third, the category of the job. I also tried

experimenting with the Job titles but they were very diverse and proved to be useless as they just increased the computation time.

## Objectives

- Processing of Collected Data from Company Employee dataset.
- Extracting necessary features for processing of employee salary.
- Data Analysis on various attribute features.
- Predicting payroll of employees.

## System Architecture

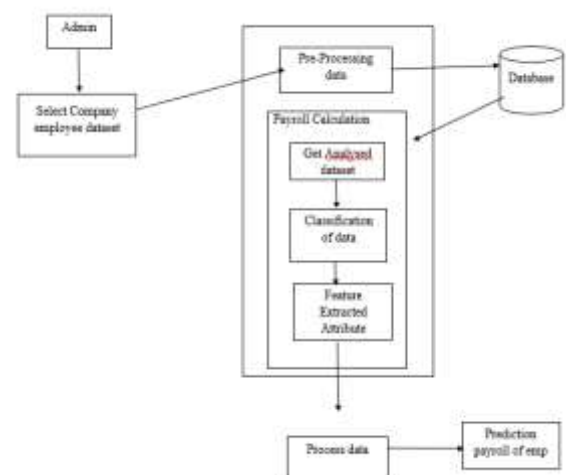


Fig1. System Architecture

## V. METHODOLOGY

### 5.1 DATA MODELLING

PROCESS Organizations can profit from the use of Prediction Models and get largely accurate predictions rested on their data. The model can help to uncover the factors which contribute to the issues the most-has the most effect on the data set. Within this research, the Prediction Model is looking for the factors affecting waste and get insights hand gets by

using Prediction Explanations. The system has two phases- Training and Testing Phase. Expert knowledge is used for developing class markers in the Training Phase. Relationships between features are defined according to data. Also ML algorithms process the data. Within this phase, we use 70 percentage of the data set for training. In the Testing Phase the rest 30 percentage of data is used. Prophetic Model is applied for testing if these workers would leave their organization. By using this model high- impact factors can be honored to help organizations to concentrate their strategies and opinions on utmost applicable issues.

### 5.2 DATA TRAINING

Data set used was acquired from KAGGLE. The sample shape is 14999 with a aggregate of 10 attributes. Attributes include several descriptive measures. It also includes all once and present records of workers. The crucial target is ' Waste '. Measures describing hand motivational factors are pay and benefits, job involvement and training. Also, several satisfaction measures- terrain, connections and job satisfaction. The main features (attributes) presented in the data set are Employee ID, satisfaction position, last evaluation, number of systems, average yearly hours, time spend in association, accidents during work time, creation during last 5 times, department, payment

## VII. CONCLUSION

In This Application we are designed and implemented a machine learning software model for processing of employee dataset and predict payroll salary of employee using machine learning approach. Payroll Prediction is a software model for calculating efficient and accurate payroll of an employee by considering all the aspect of company requirements. Given the data, we can predict the salary of the job. Using this knowledge we can create many scenarios like what will be the salary of the job or what should be the salary of the position. We thought our application is works as company requirements.

## VIII. REFERENCES

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